ORIGINAL
FILE

RECEIVED
DEC 11 1992
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
Redevelopment of Spectrum to	)	ET Docket No. 92-9
Encourage Innovation in the	)	
Use of New Telecommunications	)	RM-7981
Technologies	)	RM-8004

AT&T COMMENTS

American Telephone and Telegraph Company ("AT&T") hereby comments on the Further Notice of Proposed Rulemaking (the "Notice"), released September 4, 1992. The Notice (p. 2) "proposes to reallocate five bands above 3 GHz to private and common carrier fixed microwave use on a co-primary basis and to prescribe additional technical standards to govern use of these bands."[1]

---

1 This Notice was released in connection with the Notice of Proposed Rule Making, ET Docket No. 92-9, 7 FCC Rcd. 1542 (1992), which proposed that the 1.85-1.99, 2.13-2.15, and 2.18-2.20 GHz bands currently allocated to the Private Operational-Fixed Microwave Service (Part 94) and the 2.11-2.13 and 2.16-2.18 GHz bands currently allocated to the common carrier Domestic Public Fixed Radio Services (Part 21) and Public Mobile Service (Part 22) be reallocated for emerging technologies. The Commission recognized therein that it should be technically feasible to relocate certain incumbent 2 GHz licensees to alternative media or to higher frequency fixed microwave bands.

No. of Copies rec'd 0+5
List A B C D E

Specifically, the Notice (p. 9) proposes "that 80 MHz of spectrum in the 4 GHz band currently allocated to the Fixed-Satellite Service (FSS) on a primary basis [should not] be downgraded to secondary . . . , [and] will allow 20 existing point-to-multipoint users of the 10 GHz band to remain on a grandfathered basis." In addition, the Notice (id.) proposes to adopt Alcatel's plan to reallocate the 6 GHz band to private fixed use on a co-primary basis with existing common carrier FSS.[2] The Notice (p. 13) also notes that, "[w]ith respect to coordination procedures in the bands proposed for reallocation . . . the basic difference in private and common carrier procedures is that in common carrier bands new users must notify potentially-affected licensees of their planned use, whereas there is no such requirement in private bands." To cause the least disruption to the current users, the Notice (pp. 13-14) proposes that "in the 4, 6, 10, and 11 GHz common carrier bands . . . Part 21 coordination procedures be used, whereas in the 6 GHz private band . . . Part 94 procedures be used."

AT&T supports the Commission's efforts to rechannelize these bands to provide additional narrowband channels and to maintain coordination procedures to

---

2 See, Petition for Rule Making, RM-8004, filed by Alcatel Network Systems, Inc. ("Alcatel") on May 22, 1992.

accommodate the relocation of 2 GHz incumbents. The services currently offered by 2 GHz incumbents are important and AT&T is also committed "to take any steps necessary to prevent disruptions to them." (Notice, p. 2). AT&T agrees with the Commission that retention of the current allocation for satellite applications at 4 GHz is essential for an expanding telecommunications industry, because it allows for equitable treatment for both private users and common carriers. However, if the Notice's proposal is implemented, scarce spectrum that is currently unoccupied would be needlessly channelized and incumbents in the 4 GHz and 6 GHz bands would both be unnecessarily disrupted. AT&T is one of the largest operators of 4 GHz to 6 GHz point-to-point microwave systems and also is a major provider of satellite transmission facilities. It shares the Commission's transition concerns regarding the relocation of low and medium capacity fixed system incumbents to primarily high capacity bands above 3 GHz.[3]

The specific channelization proposals set forth by the Commission appear unnecessarily disruptive to 4, 6 and

---

[3] AT&T further supports common coordination requirements for both Part 21 and Part 94 applications, as well as a more flexible approach to Automatic Transmitter Power Control providing for a relatively wide range of radiated power, because it should mandate a more economic and efficient use of the spectrum.

11 GHz incumbents. Specifically, the channelizations described in the Notice, if adopted, would significantly reduce spectrum efficiency by revising the current channel boundaries and creating a myriad of additional coordination demands on current and relocating licensees. AT&T has developed alternative proposals, which should maintain current channelization integrity, create an expanded priority procedure to use spectrum more effectively, and provide separate FM and digital channelization schemes to satisfy the distinct system needs of incumbent upper 6 GHz private band users.[4]

In all bands, AT&T proposes sub-channels within the boundaries of existing paired channel operations. Thus, AT&T's plan for the 4 GHz common carrier bands avoids rechannelization in the relatively unused spectrum in upaired channel 13. Because one way (unpaired) channels are rare, the Commission might later decide to allocate this channel for other uses, such as licensed premises services. AT&T's proposal allows for this possibility. (See Appendix A). AT&T additionally suggests in its 6 GHz common carrier spectrum plan that the Commission not channelize the

---

[4] See AT&T's alternative channelization proposals in appendices A, B, C and D regarding 4 GHz, 6 GHz and 11 GHz common carrier bands, and the upper 6 GHz private band, respectively.

spectrum in the lightly used guard bands, but reserve this spectrum for future needs such as personal communications services or other future technologies.[5] Spectrum adjacent to these guard bands (channel pairs 11/21 and 18/28) also should not be rechannelized at this time in order to permit use of these bands for possible future technologies. (See Appendix B). At 11 GHz, the AT&T proposal preserves the currently clear band between 11185 and 11215 MHz and the lightly utilized adjacent spectrum for future Commission options as well. (See Appendix C).

The AT&T proposal restructures and slightly reduces channelization at 4 and 6 GHz and significantly increases channels at 11 GHz. It should supply an abundance of choice for 2 GHz users that may relocate. At the same time, it preserves options for the Commission to consider future technologies before further rechannelization. Most importantly, it maintains the integrity of current channelization.[6]

---

5 The technical feasibility of operating at 6 GHz has been set forth in AT&T's quarterly trial reports.

6 Related coordination issues and rule changes to support these valuable segments of spectrum should also be carefully considered to provide maximum benefits for all concerned. It is necessary to establish long term spectrum reserves to encourage the growth of new and existing systems and updated antenna characteristics to reduce future coordination problems. AT&T has addressed these concerns in Appendix E, attached hereto.

AT&T's proposal additionally accommodates the large number of narrower band channels that may be needed to meet the relocation requirements of existing cellular and personal commnication system links between cell sites and central offices. Moreover, it avoids unnecessary rechannelization that might unduly constrain the Commission's flexibility to consider future reallocation. Further, AT&T's proposal also sets forth a selection prioritization scheme that would alert the Commission when first choice channels were becoming fully occupied.

AT&T also encourages the Commission to continue discussions with the National Telecommunication Industry Association ("NTIA") for access by non-government licensees to the 1.71-1.85 GHz government band. The state and local government and public safety 2 GHz incumbent operators in spectrum allocated for unlicensed applications should then be given priority access to any spectrum that becomes available as a result of these negotiations.[7]

---

[7] In addition, it is becoming increasingly evident that an adequate amount of clear spectrum to support unlicensed applications may not become readily available. Thus, the Commission should consider creating a larger spectrum reserve at 5 GHz. Such a reserve could be structured similar to the plan to develop HIPERLAN at 5 GHz in Europe. This plan allows for an extensive bandwidth for LAN systems between 5150 and 5250 MHz. AT&T understands there to be no plans for use by the aeronautical community, which would allow for a possible global allocation. If the Commission chooses not to address this issue in this proceeding, AT&T requests

(footnote continued on following page)

CONCLUSION

For all the foregoing reasons, AT&T generally supports the Commission's efforts to rechannelize the 4, 6 and 11 GHz bands and to otherwise modify specific rules. To avoid unnecessary disruption to the incumbents in these bands, to provide for coordination considerations, and to preserve or create flexibility for future reallocations, AT&T proposes modifications to these proposals as set forth in Appendices A through E, attached hereto.

Respectfully submitted,

AMERICAN TELEPHONE AND TELEGRAPH COMPANY

By: David P. Condit

Francine J. Berry
David P. Condit
Sandra Williams Smith

Its Attorneys

295 North Maple Avenue
Room 3244J1
Basking Ridge, New Jersey 07920

Dated: December 11, 1992

(footnote continued from previous page)

that the Commission then issue another NPRM to consider a reallocation at 5 GHz.

1. 4 GHz FREQUENCY PLAN

1.1 COMMENTS ON THE NOTICE The Notice suggests a frequency plan for 3700 to 4200 MHz starting on page 27 of Appendix A. This plan would likely prove adequate if the band were free of incumbent users, however, since there are incumbents present in the band, AT&T summarizes below its reservations regarding the plan.

1. The plan uses a transmit/receive separation that is different than the embedded systems. It proposes the use of both 220 MHz and 460 MHz separations. The deployed systems were planned on a 40 MHz separation. The introduction of this plan would result in spectrum inefficiencies due to the need to clear multiple 20 MHz channels to accommodate a small capacity need.

For example, to clear the spectrum for a single 400 KHz application, it would be necessary to insure non-interference with both channel 7A (3710 MHz) and channel 6B (4170 MHz) of the existing TD frequency plan. The mate channels 7B (3750 MHz) and 6A (4130 MHz) would be idle, thus destroying spectrum efficiency.

2. The Notice plan arbitrarily reassigns all existing 20 MHz bandwidth users to different frequencies. Thus, in order to obtain the use of the narrow channels, in many cases, it will be necessary to reassign existing 20 MHz users to the new plan. The cost of the reassignment would be borne by the party desiring to obtain the use of the spectrum (or perhaps the third party desiring use of 2 GHz). Since this reassignment is unnecessary as shown below in AT&T's proposed plan, adoption of the Notice plan would not be in the best interest of all parties.

3. The Notice plan destroys the existing junction interference plan. The embedded 4 GHz systems were planned with all junctions being either A or B transmit locations. Thus all routes terminating on the junction would operate on the same frequency plans transmitting. This planning was necessary to minimize the cases where coupling from nearby antennas would cause excessive interference. Since the Notice mixes frequencies which were in both A and B plans, the order can no longer be maintained.

4. In some cases the Notice plan uses channel assignments to 4 decimal places. These assignments appear to be arbitrary and unnecessary since better spectrum efficiency would result if the boundaries between channels remained the same regardless of bandwidth. The use of the 4 decimal place channels results in unused spectrum when a smaller bandwidth channel is used.

1.2 EXISTING "TD" FREQUENCY PLAN The 4 GHz spectrum is populated with channels that were assigned using the "TD" frequency plan. The plan evolved from the AT&T's pioneering of microwave for nationwide television and telephone communications.

The plan uses two sets of frequencies separated by 40 MHz for transmit and receive. Channels 1 to 6 of the plan are interleaved with channels 7 to 12. The plan has been used for nearly all applications at 4 GHz. The only exceptions are in special situations such as Mexican border crossings. The following table describes this plan:

"TD" FREQUENCY PLAN

Channel Number	A Frequency (MHz)	B Frequency (MHz)
7	3710 ----------	3750
1	3730 ----------	3770
8	3790 ----------	3830
2	3810 ----------	3850
9	3870 ----------	3910
3	3890 ----------	3930
10	3950 ----------	3990
4	3970 ----------	4010
11	4030 ----------	4070
5	4050 ----------	4090
12	4110 ----------	4150
6	4130 ----------	4170
13	4190 (Unpaired)	
	or	
Aux	4190 ----------	4198

Channels 1-6 are assigned one polarity, and 7-12 the other. Thus all 12 channels can be used on each route.

Although the original plan was intended for FM systems, the plan was carried forward into digital radio systems. This was done to allow the orderly introduction of digital systems. However, since the newer digital systems contain overhead bits for order wire and alarm telemetry, the need for the auxiliary channels disappeared.

1.3 PROPOSED 4 GHz FREQUENCY PLAN The proposed 4 GHz frequency plan is shown in Table 1 on pages 4-12 of this appendix. In this plan compatibility is maintained with the existing "TD" frequency plan. For ease in understanding the plan, all frequency assignments are sequential starting on page 1 with 3700 MHz. The following channel number scheme was used to designate the different bandwidths in the plan:

Proposed 4 GHz Channel Numbers

Channel Number Range	Bandwidth (MHz)
1-99 ----------	20.0
201-299 ----------	10.0
301-399 ----------	5.0
401-499 ----------	1.6
501-599 ----------	0.8
601-699 ----------	0.4

The proposed plan provides a better balance between the needs for narrow channels and wide channels. The following table compares the proposed plan channel capacity with the Notice plan:

Channel Number Range	Bandwidth (MHz)	AT&T Plan Channel Pairs	Notice Plan Channel Pairs
0-99	20.0	7 1st Choice 5.5 Last Choice	10 Shared 2 Last Choice
201-299	10.0	6 1st Choice 6 Last Choice	21 Shared 4 Last Choice
301-399	5.0	4 1st Choice 2 Last Choice	6 Shared
401-499	1.6	6 1st Choice 19 Last Choice	24 Shared
501-599	0.8	6 1st Choice 19 Last Choice	12 Shared
601-699	0.4	14 1st Choice 11 Last Choice	24 Shared

In the table above, "Shared" channels share the spectrum with other bandwidth applications; "1st Choice" channels only need to share with applications of the same bandwidth and the grandfathered incumbents; "Last Choice" channels are only assigned to that application upon a showing that all other channel options are not available.

AT&T's plan proposal provides more orderly migration to the new environment since every potential user, new and old, has a location where their bandwidth needs can be met without unnecessarily requiring the negotiated displacement of the incumbent use. If the mix of channel bandwidths changes, it can easily be modified to allow more or less users of a given bandwidth.

The Commission should also consider the potential of 20 MHz for 4 GHz future technologies. This spectrum is what was previously predominately used for auxiliary channels. It is shown on page 12 of Table 1. Since these channels are not used in modern digital systems, it generally is clear of interference. This spectrum may be usable for future unpaired applications provided it can be shown that the application would not interfere with receive earth stations which share this spectrum.

The following table describes the proposed frequency plan in more detail:

TABLE 1 PROPOSED 4 GHz FREQUENCY PLAN - APPENDIX A - PAGE 4

REF FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)
	Existing 20 MHz			Prop. 10 MHz			Prop. 5 MHz			Prop. 400 KHz		
3700.0												
3702.5							301A		3702.5			
3705.0				201A	1	3705.0						
3707.5							302A		3707.5			
3710.0	7A	1	3710.0				Prop. 1.6 MHz					
3710.0							401A		3710.8			
3710.8												
3711.6							402A		3712.4			
3712.4												
3713.2							403A		3714.0			
3714.0												
3714.8												
3715.0				202A	1	3715.0						
3715.6							404A		3715.6			
3716.4												
3717.2							405A		3717.2			
3718.0												
3718.8							406A		3718.8			
3719.6												
3719.8							Prop. 5 MHz			601A		3719.8
3720.0												
3722.5							303A		3722.5			
3725.0				203A	1	3725.0						
3727.5							304A		3727.5	Prop. 800 KHz		
3730.0	1A	1	3730.0							501A		3730.4
3730.4												
3730.8										502A		3731.2
3731.2												
3731.6										503A		3732.0
3732.0												
3732.4										504A		3732.8
3732.8												
3733.2										505A		3733.6
3733.6												
3734.0										506A		3734.4
3734.4												
3734.8										Prop. 400 KHz		
3734.8												
3735.0				204A	1	3735.0				602A		3735.0
3735.2												
3735.4										603A		3735.4
3735.6												
3735.8										604A		3735.8
3736.0												
3736.2										605A		3736.2
3736.4												
3736.6										606A		3736.6
3736.8												

Note 1 - Alternate Channel - Use if all other channels are full.

TABLE 1 PROPOSED 4 GHz FREQUENCY PLAN - APPENDIX A - PAGE 5

REF FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)
	Existing 20 MHz			Prop. 10 MHz			Prop. 5 MHz			Prop. 400 KHz		
3736.8										607A		3737.0
3737.0												
3737.2										608A		3737.4
3737.4												
3737.6										609A		3737.8
3737.8												
3738.0	1A		See Above	204A		See Above				610A		3738.2
3738.2												
3738.4										611A		3738.6
3738.6												
3738.8										612A		3739.0
3739.0												
3739.2										613A		3739.4
3739.4												
3739.6										614A		3739.8
3739.8												
3740.0	---		---	---		---	---		---	---		---
3742.5							301B		3742.5			
3745.0				201B		3745.0						
3747.5					1		302B		3747.5			
3750.0	7B		3750.0	---		---	---		---			
		1					Prop. 1.6 MHz					
3750.0							---		---			
3750.8							401B		3750.8			
3751.6												
3752.4							402B		3752.4			
3753.2												
3754.0							403B		3754.0			
3754.8												
3755.6				202B		3755.0	404B		3755.6			
3756.4					1							
3757.2							405B		3757.2			
3758.0												
3758.8							406B		3758.8			
3759.6												
3759.8							Prop. 5 MHz			601B		3759.8
3760.0	---		---	---		---	---		---	---		---
3762.5							303B		3762.5			
3765.0				203B		3765.0						
3767.5					1		304B		3767.5	Prop. 800 KHz		
3770.0	1B		3770.0	---		---	---		---	---		---
3770.4		1								501B		3770.4
3770.8												
3771.2				204B		See Below				502B		3771.2
3771.6												
3772.0										503B		3772.0
3772.4												
3772.8										504B		3772.8
3773.2												

Note 1 - Alternate Channel - Use if all other channels are full.

TABLE 1 PROPOSED 4 GHz FREQUENCY PLAN - APPENDIX A - PAGE 6

REF FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)
	Existing 20 MHz			Prop. 10 MHz			Prop. 1.6 MHz			Prop. 800 KHz		
3773.2										505B		3773.6
3773.6												
3774.0										506B		3774.4
3774.4												
3774.8										Prop. 400 KHz		
3774.8												
3775.0				204B	1	3775.0				602B		3775.0
3775.2										603B		3775.4
3775.4												
3775.6										604B		3775.8
3775.8												
3776.0										605B		3776.2
3776.2	1B		See Above									
3776.4										606B		3776.6
3776.6												
3776.8										607B		3777.0
3777.0												
3777.2										608B		3777.4
3777.4												
3777.6										609B		3777.8
3777.8												
3778.0										610B		3778.2
3778.2												
3778.4										611B		3778.6
3778.6												
3778.8										612B		3779.0
3779.0												
3779.2										613B		3779.4
3779.4												
3779.6										614B		3779.8
3779.8												
3780.0	---		---	---		---	---		---	---		---
3780.8							407A	1	3780.8			
3781.6												
3782.4							408A	1	3782.4			
3783.2												
3784.0							409A	1	3784.0			
3784.8												
3785.6				205A		3785.0	410A	1	3785.6			
3786.4												
3787.2							411A	1	3787.2			
3788.0												
3788.8							412A	1	3788.8			
3789.6												
3789.8										615A	1	3789.8
3790.0	8A		3790.0	---		---	---		---	---		---
3790.8		1					413A	1	3790.8			
3791.6												

Note 1 - Alternate Channel - Use if all other channels are full.

TABLE 1 PROPOSED 4 GHz FREQUENCY PLAN - APPENDIX A - PAGE 7

REF FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)
	Existing 20 MHz			Prop. 10 MHz			Prop. 1.6 MHz			Prop. 400 KHz		
3791.6												
3792.4							414A	1	3792.4			
3793.2												
3794.0							415A	1	3794.0			
3794.8												
3795.6				206A		3795.0	416A	1	3795.6			
3796.4	8A		See Above									
3797.2							417A	1	3797.2			
3798.0												
3798.8							418A	1	3798.8			
3799.6												
3799.8										616A	1	3799.8
3800.0												
3800.8							419A	1	3800.8			
3801.6												
3802.4							420A	1	3802.4			
3803.2												
3804.0							421A	1	3804.0	Prop. 800 KHz		
3804.8												
3805.0				207A		3805.0						
3805.2										507A	1	3805.2
3805.6												
3806.0										508A	1	3806.0
3806.4												
3806.8										509A	1	3806.8
3807.2												
3807.6										510A	1	3807.6
3808.0												
3808.4										511A	1	3808.4
3808.8												
3809.2										512A	1	3809.2
3809.6												
										Prop. 400 KHz		
3809.6												
3809.8										617A	1	3809.8
3810.0	2A		3810.0									
3810.8		1					422A	1	3810.8			
3811.6												
3812.4							423A	1	3812.4			
3813.2												
3814.0							424A	1	3814.0	Prop. 800 KHz		
3814.8												
3815.0				208A		3815.0						
3815.2										513A	1	3815.2
3815.6												
3816.0										514A	1	3816.0
3816.4												
3816.8										515A	1	3816.8
3817.2												

Note 1 - Alternate Channel - Use if all other channels are full.

TABLE 1 PROPOSED 4 GHz FREQUENCY PLAN - APPENDIX A - PAGE 8

REF FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)
	Existing 20 MHz			Prop. 10 MHz			Prop. 1.6 MHz			Prop. 800 KHz		
3817.2												
3817.6										516A	1	3817.6
3818.0												
3818.4										517A	1	3818.4
3818.8												
3819.2	2A		See Above	208A		See Above				518A	1	3819.2
3819.6												
										Prop. 400 KHz		
3819.6												
3819.8										618A	1	3819.8
3820.0	---		---	---		---	---		---	---		---
3820.8							407B	1	3820.8			
3821.6												
3822.4							408B	1	3822.4			
3823.2												
3824.0							409B	1	3824.0			
3824.8												
3825.6				205B		3825.0	410B	1	3825.6			
3826.4												
3827.2							411B	1	3827.2			
3828.0												
3828.8							412B	1	3828.8			
3829.6												
3829.8										615B	1	3829.8
3830.0	8B		3830.0	---		---	---		---	---		---
3830.8		1					413B	1	3830.8			
3831.6												
3832.4							414B	1	3832.4			
3833.2												
3834.0							415B	1	3834.0			
3834.8												
3835.6				206B		3835.0	416B	1	3835.6			
3836.4												
3837.2							417B	1	3837.2			
3838.0												
3838.8							418B	1	3838.8			
3839.6												
3839.8										616B	1	3839.8
3840.0	---		---	---		---	---		---	---		---
3840.8							419B	1	3840.8			
3841.6												
3842.4							420B	1	3842.4			
3843.2												
3844.0							421B	1	3844.0	Prop. 800 KHz		
3844.8												
3845.0	2B		See Below	207B		3845.0						
3845.2										507B	1	3845.2
3845.6												
3846.0										508B	1	3846.0
3846.4												

Note 1 - Alternate Channel - Use if all other channels are full.

TABLE 1 PROPOSED 4 GHz FREQUENCY PLAN - APPENDIX A - PAGE 9

REF FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)
	Existing 20 MHz			Prop. 10 MHz			Prop. 1.6 MHz			Prop. 800 KHz		
3846.4										509B	1	3846.8
3846.8												
3847.2										510B	1	3847.6
3847.6												
3848.0										511B	1	3848.4
3848.4				207B	See Above							
3848.8										512B	1	3849.2
3849.2												
3849.6										Prop. 400 KHz		
3849.6												
3849.8										617B	1	3849.8
3850.0	2B		3850.0	----------		----------	----------		----------	----------		----------
3850.8		1					422B	1	3850.8			
3851.6												
3852.4							423B	1	3852.4			
3853.2												
3854.0							424B	1	3854.0	Prop. 800 KHz		
3854.8												
				208B		3855.0				513B	1	3855.2
3855.2												
3855.6										514B	1	3856.0
3856.0												
3856.4										515B	1	3856.8
3856.8												
3857.2										516B	1	3857.6
3857.6												
3858.0										517B	1	3858.4
3858.4												
3858.8										518B	1	3859.2
3859.2												
3859.6										Prop. 400 KHz		
3859.6												
3859.8										618B	1	3859.8
3860.0	----------		----------	----------		----------	----------		----------	----------		----------
3860.2										619A	1	3860.2
3860.4												
3860.6										620A	1	3860.6
3860.8												
3861.0										621A	1	3861.0
3861.2												
3861.4										622A	1	3861.4
3861.6	9A		See Below	209A		See Below						
3861.8										623A	1	3861.8
3862.0												
3862.2										624A	1	3862.2
3862.4												
3862.6										625A	1	3862.6
3862.8												

Note 1 - Alternate Channel - Use if all other channels are full.

TABLE 1 PROPOSED 4 GHz FREQUENCY PLAN - APPENDIX A - PAGE 10

REF FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)
	Existing 20 MHz			Prop. 10 MHz			Prop. 1.6 MHz			Prop. 800 KHz		
3862.8										519A	1	3863.2
3863.2												
3863.6										520A	1	3864.0
3864.0												
3864.4										521A	1	3864.8
3864.8												
3865.2				209A		3865.0				522A	1	3865.6
3865.6												
3866.0										523A	1	3866.4
3866.4												
3866.8										524A	1	3867.2
3867.2												
3867.6										525A	1	3868.0
3868.0												
3868.4												
3869.2							425A	1	3869.2			
3870.0	9A	1	3870.0									
							Prop. 5 MHz					
3870.0												
3872.5							305A	1	3872.5			
3875.0				210A		3875.0						
3877.5							306A	1	3877.5			
3880.0												
3885.0				211A	1	3885.0						
3890.0	3A		3890.0									
3895.0				212A	1	3895.0						
3900.0										Prop. 400 KHz		
3900.2										619B	1	3900.2
3900.4												
3900.6										620B	1	3900.6
3900.8												
3901.0										621B	1	3901.0
3901.2												
3901.4										622B	1	3901.4
3901.6												
3901.8										623B	1	3901.8
3902.0												
3902.2										624B	1	3902.2
3902.4	9B See Below											
3902.6										625B	1	3902.6
3902.8												
										Prop. 800 KHz		
3902.8												
3903.2										519B	1	3903.2
3903.6												
3904.0										520B	1	3904.0
3904.4												
3904.8										521B	1	3904.8
				209B		3905.0						
3905.2												

Note 1 - Alternate Channel - Use if all other channels are full.

TABLE 1 PROPOSED 4 GHz FREQUENCY PLAN - APPENDIX A - PAGE 11

REF FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)
	Existing 20 MHz			Prop. 10 MHz			Prop. 1.6 MHz			Prop. 800 KHz		
3905.2										522B	1	3905.6
3905.6												
3906.0										523B	1	3906.4
3906.4												
3906.8				209B	See Above					524B	1	3907.2
3907.2												
3907.6										525B	1	3908.0
3908.0												
3908.4												
3909.2							425B	1	3909.2			
3910.0	9B	1	3910.0									
							Prop. 5 MHz					
3910.0												
3912.5							305B	1	3912.5			
3915.0				210B		3915.0						
3917.5							306B	1	3917.5			
3920.0												
3925.0				211B	1	3925.0						
3930.0	3B		3930.0									
3935.0				212B	1	3935.0						
3940.0												
3950.0	10A		3950.0									
3960.0												
3970.0	4A		3970.0									
3980.0												
3990.0	10B		3990.0									
4000.0												
4010.0	4B		4010.0									
4020.0												
4030.0	11A		4030.0									
4040.0												
4050.0	5A		4050.0									
4060.0												
4070.0	11B		4070.0									
4080.0												
4090.0	5B		4090.0									
4100.0												
4110.0	12A		4110.0									
4120.0												
4130.0	6A		4130.0									
4140.0												
4150.0	12B		4150.0									
4160.0												
4170.0	6B		4170.0									
4180.0												

Note 1 - Alternate Channel - Use if all other channels are full.

TABLE 1 PROPOSED 4 GHz FREQUENCY PLAN - APPENDIX A - PAGE 12

REF FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)	CHAN NO.	NOTE	CENTER FREQ (MHz)
4180.0												
4190.0	13	1	4190.0 1-WAY	FUTURE TECHNOLOGIES 20 MHz UNPAIRED								
4200.0												

SUMMARY

	20 MHz	10 MHz	5 MHz	800 KHz
TOT CH PAIRS	12.5	12	6	25
1ST CHOICE	7.0	6	4	6
LAST CHOICE	5.5	6	2	19

	1.6 MHz	400 KHz
TOT CH PAIRS	25	25
1ST CHOICE	6	14
LAST CHOICE	19	11

Note 1 - Alternate Channel - Use if all other channels are full.

1. LOWER 6 GHz FREQUENCY PLAN

1.1 COMMENTS ON THE NOTICE The Notice suggests a frequency plan for 5925 to 6425 MHz. (Notice, p. 30, App. A). Although this plan would likely prove adequate if the band were free of incumbent users, it is seriously flawed for the current environment. The following summarizes these concerns:

1. The plan uses a transmit/receive separation that is different than the embedded systems. It proposes the use of a 250 MHz separation. The existing systems were planned on a 252.04 MHz separation. The introduction of a different channel separation would lead to spectrum inefficiency as multiple channels could be impacted by a single channel addition.

For example to clear the spectrum for a single 10 MHz application at 6045 MHz, it would be necessary to insure non-interference with both channel 14 (6034.154 MHz) and channel 15 (6063.806 MHz) of the predominately used TH frequency plan. Likewise, the same impact would be noted on the mate frequencies.

2. The Notice plan arbitrarily reassigns all existing users to slightly different frequencies. To accommodate the plan, the existing users would need to change their center frequency by a few MHz. The cost for new crystals, and RF filters would need to be born by the party requesting the spectrum. This is an unnecessary expense.

3. The plan proposed in the Notice does not reserve any spectrum for future technologies.

4. The plan uses channel bandwidths that are not multiples of the embedded channels. The existing systems were built using 29.652 MHz bandwidth channels. The arbitrary change to 30.0 MHz creates both unnecessary cost, and difficulties in coordination similar to the above where more than one channel is affected by a single action.

1.2 EXISTING "TH" FREQUENCY PLAN In nearly all cases, the 6 GHz spectrum is populated with channels that were assigned using the "TH" frequency plan. The plan uses two sets of frequencies separated by 252.04 MHz for transmit and receive. Eight 29.652 MHz channels are assigned in the lower half of the band, and 8 in the upper. Occasionally, applications used split and staggered plans to avoid co-channel FM carrier interference. However, these plans are obsolete. The following table describes the "TH" plan:

"TH" FREQUENCY PLAN

Channel Number (x)	1x Frequency (MHz)	2x Frequency (MHz)
1	5945.198	6197.238
2	5974.850	6226.890
3	6004.502	6256.542
4	6034.154	6286.194
5	6063.806	6315.846
6	6093.458	6345.498
7	6123.110	6375.150
8	6152.762	6404.802

The even channels are assigned one polarity, and the odd on the other. Thus all 8 channels can be used on each route.

The original plan also included channels 10, 19, 20 and 29 as auxiliary channels for order wire and telemetry. However, most of these applications have disappeared as the more modern systems include this capability on the overhead bits. Thus this spectrum previously used by the auxiliary channels as well as a guard band in the middle are essentially free of interference.

Although the original plan was intended for FM systems, the plan was carried forward into digital radio systems. This was done to allow the orderly introduction of digital systems.

1.3 PROPOSED 6 GHz FREQUENCY PLAN The proposed 6 GHz frequency plan is shown in Table 1 on pages 4-12 of this appendix. In this plan compatibility is maintained with the existing "TH" frequency plan. For ease in understanding the plan, all frequency assignments are sequential starting on page 4 with 5925 MHz. The following channel number scheme was used to designate the different bandwidths in the plan:

Proposed 6 GHz Channel Numbers

Channel Number Range	Bandwidth (MHz)
1-99	29.652
201-299	9.884
301-399	4.942
401-499	1.6
501-599	0.8
601-699	0.4

The proposed plan provides a better balance between the needs of narrow channels and wide channels. The following table compares the proposed plan channel capacity with the Notice plan:

Channel Number Range	Bandwidth (MHz)	AT&T Plan Channel Pairs	Notice Plan Channel Pairs
0-99	29.652	3 1st Choice 5 Last Choice	6 Shared 2 Last Choice
201-299	9.884	3 1st Choice 3 Last Choice	18 Shared 6 Last Choice
301-399	4.942	6 1st Choice 6 Last Choice	12 Shared
401-499	1.6	9 1st Choice 3 Last Choice	42 Shared
501-599	0.8	6 1st Choice 25 Last Choice	12 Shared
601-699	0.4	26 1st Choice 12 Last Choice	24 Shared

In the table above, "Shared" channels share the spectrum with other bandwidth applications; "1st Choice" channels only need to share with applications of the same bandwidth and the grandfathered incumbents; "Last Choice" channels are only assigned to that application upon a showing that all other channel options are not available.

AT&T's plan proposal provides more orderly migration to the new environment. Every potential user, new and old, has a location where their bandwidth needs can be met without unnecessarily requiring the negotiated displacement of the incumbent users. If the mix of channel bandwidths changes, it can easily be modified to allow more or less users of a given bandwidth.

AT&T's plan also proposes the reservation of the spectrum that was previously predominately used for auxiliary channels at 6 GHz for future technologies such as PCS. Since the auxiliary channels are not used in modern digital systems, it generally is clear of interference. In addition, the plan suggests the potential for future technologies in the adjacent channels 11, 18, 21 and 28.

The following table describes the proposed frequency plan in more detail:

TABLE 1 PROPOSED LOWER 6 GHz FREQUENCY PLAN - APPENDIX B - PAGE 4

REF FREQ (MHz)	CH NO.	NOTE	CENTER FREQ (MHz)	CH NO.	NOTE	CENTER FREQ (MHz)	CH NO.	NOTE	CENTER FREQ (MHz)	CH NO.	NOTE	CENTER FREQ (MHz)
	Existing "T" Plan 29.652 MHz											
5925.000				FUTURE TECHNOLOGIES SUCH AS PCS PAIRED (5.372 MHz)								
	GUARD/AUX											
5930.372												
5945.198	11	1	5945.198	FUTURE TECHNOLOGIES PAIRED (29.652 MHz)								
5960.024												
5974.850	12		5974.850									
5989.676				Prop. 1.6 MHz			Prop. 800 KHz					
5989.702												
5990.102							501A	1	5990.102			
5990.502				401A		5990.502						
5990.902							502A	1	5990.902			
5991.302												
5991.702							503A	1	5991.702			
5992.102				402A		5992.102						
5992.502							504A	1	5992.502			
5992.902												
5993.302							505A	1	5993.302			
	13		See Below									
5993.702				403A		5993.702						
5994.102							506A	1	5994.102			
5994.502												
5994.902							507A	1	5994.902			
5995.302				404A		5995.302						
5995.702							508A	1	5995.702			
5996.102												
5996.502							509A	1	5996.502			
5996.902				405A		5996.902						
5997.302							510A	1	5997.302			
5997.702												
5998.102							511A	1	5998.102			
5998.502				406A		5998.502						
5998.902							512A	1	5998.902			
5999.302												

Note 1 - Alternate Channel - Use if all other channels are full.

TABLE 1 PROPOSED LOWER 6 GHz FREQUENCY PLAN - APPENDIX B - PAGE 5

REF FREQ (MHz)	CH NO.	NOTE	CENTER FREQ (MHz)	CH NO.	NOTE	CENTER FREQ (MHz)	CH NO.	NOTE	CENTER FREQ (MHz)	CH NO.	NOTE	CENTER FREQ (MHz)
	Existing "T" Plan 29.652 MHz			Prop. 1.6 MHz			Prop. 800 KHz			Prop. 400 KHz		
5999.302												
5999.502										601A		5999.502
5999.702							513A		5999.702			
5999.902								1		602A		5999.902
6000.102												
6000.302										603A		6000.302
6000.502							514A		6000.502			
6000.702								1		604A		6000.702
6000.902												
6001.102										605A		6001.102
6001.302							515A		6001.302			
6001.502								1		606A		6001.502
6001.702												
6001.902										607A		6001.902
6002.102							516A		6002.102			
6002.302								1		608A		6002.302
6002.502												
6002.702										609A		6002.702
6002.902							517A		6002.902			
6003.102								1		610A		6003.102
6003.302												
6003.502										611A		6003.502
6003.702							518A		6003.702			
6003.902								1		612A		6003.902
6004.102												
6004.302										613A		6004.302
6004.502							519A		6004.502			
6004.702								1		614A		6004.702
6004.502	13		6004.502									
6004.902		1										
6005.102										615A		6005.102
6005.302							520A		6005.302			
6005.502								1		616A		6005.502
6005.702												
6005.902										617A		6005.902
6006.102							521A		6006.102			
6006.302								1		618A		6006.302
6006.502												
6006.702										619A		6006.702
6006.902							522A		6006.902			
6007.102								1		620A		6007.102
6007.302												
6007.502										621A		6007.502
6007.702							523A		6007.702			
6007.902								1		622A		6007.902
6008.102												

Note 1 - Alternate Channel - Use if all other channels are full.

TABLE 1 PROPOSED LOWER 6 GHz FREQUENCY PLAN - APPENDIX B - PAGE 6

REF FREQ (MHz)	CH NO.	NOTE	CENTER FREQ (MHz)	CH NO.	NOTE	CENTER FREQ (MHz)	CH NO.	NOTE	CENTER FREQ (MHz)	CH NO.	NOTE	CENTER FREQ (MHz)
	Existing "T" Plan 29.652 MHz			Prop. 1.6 MHz			Prop. 800 KHz			Prop. 400 KHz		
6008.102										623A		6008.302
6008.302												
6008.502							524A	1	6008.502	624A		6008.702
6008.702												
6008.902										625A		6009.102
6009.102												
6009.302							525A	1	6009.302	626A		6009.502
6009.502												
6009.702										627A	1	6009.902
6009.902												
6010.102										628A	1	6010.302
6010.302												
6010.502				407A		6010.502				629A	1	6010.702
6010.702												
6010.902										630A	1	6011.102
6011.102												
6011.302										631A	1	6011.502
6011.502												
6011.702										632A	1	6011.902
6011.902												
6012.102	13		See Above	408A		6012.102				633A	1	6012.302
6012.302												
6012.502										634A	1	6012.702
6012.702												
6012.902										635A	1	6013.102
6013.102												
6013.302										636A	1	6013.502
6013.502												
6013.702				409A		6013.702				637A	1	6013.902
6013.902												
6014.102										638A	1	6014.302
6014.302												
6014.502												
6014.902							526A		6014.902			
6015.302				410A		6015.302						
6015.702					1		527A		6015.702			
6016.102												

Note 1 - Alternate Channel - Use if all other channels are full.